

ROAD QUALITY FORECASTING SYSTEM

TRANSPORTATION ASSET MANAGEMENT

Road Quality Forecasting System

The Road Quality Forecasting System (RQFS) is a strategy analysis tool used by the Michigan Department of Transportation (MDOT) to project results of pavement rehabilitation policies. Working from current pavement condition, age, and type and factoring in aging and fix strategies, RQFS estimates future condition of a pavement network.

Measuring Pavement Condition

Strategies for managing the pavement network are developed using a pavement condition measure known as *Remaining Service Life* (RSL). RSL is a measure of current pavement condition, as well as the number of years before it will require reconstruction or rehabilitation.

RSL is derived from regularly collected pavement distress data. Pavement distress data is managed in the Pavement Management System, and includes a detailed examination of type and quantity of cracks in pavements. This detailed data is used to assign a distress point value to each tenth-mile pavement segment. The higher the distress point value, the worse the condition of the pavement. RSL is determined by analyzing distress point values for a

pavement over time. This analysis uses statistically-based performance modeling software developed by MDOT.

For purposes of analysis, pavements are grouped based on RSL by category:

- I 0-2 years
- II 3-7 years
- III 8-12 years
- IV 13-17 years
- V 18-22 years and
- VI 23-25 years.

Pavement Strategies

A network pavement strategy is a collection of fixes that will, to some extent, extend the life of a road, and result in a specific distribution of asset condition in the future. Strategies are expressed as the percentage of lane miles that will move from category I to categories III, IV, V and VI as a result of annual rehabilitation or reconstruction projects. Each network pavement strategy has an associated cost. There are three basic types of fixes:

- Reconstruction and Rehabilitation (R&R)
- Capital Preventive Maintenance (CPM)
- Reactive Maintenance (RM)

Different fixes are more cost-effective when applied to pavements in certain conditions . . . and across the state, there will always be pavements in various conditions. Because of this, MDOT has determined that the most effective network pavement strategies are those employing a “mix of fixes.”



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Reconstruction & Rehabilitation

Reconstruction and Rehabilitation (R&R) fixes are applied to RSL category I pavements. Though it is a goal to delay the need for major rehabilitation as long as it is economically feasible, R&R is eventually needed to replace structural integrity of pavements. R&R consists of longer-term fixes for a pavement, generally extending its life from 10 to 25 years. Because of the greater pavement life extension they generate, R&R projects are more costly per mile than CPM.

Capital Preventive Maintenance

The Capital Preventive Maintenance (CPM) program was established in 1992 to address pavement problems before a highway asset reached poor condition. CPM projects are cost effective, shorter term fixes used to delay the deterioration of pavements

to Category I. CPM projects are fixes aimed at preventing small problems from becoming critical. They are intended to address pavement problems before the structural integrity of the pavement has been severely impacted.

Fixes include treatments such as crack sealing, surface seals, thin asphalt overlays, concrete patching and pavement profiling to improve ride quality. CPM projects usually move pavements starting in category II, III, IV or V and increase their RSL by one or two categories. Nonetheless, these are not "Band-Aid" fixes. They are proven asset management options which mitigate or delay highway asset deterioration, thus keeping our pavements in good riding condition.

CPM fixes can only be applied a limited number of times. Eventually, pavements reach a level where deterioration leads to the breakdown of a pavement's structural integrity.

However, CPM fixes are preferable to more costly R&R fixes. Thus, for a given budget, this allows MDOT to address many more miles of pavement with CPM than R&R.

Reactive Maintenance

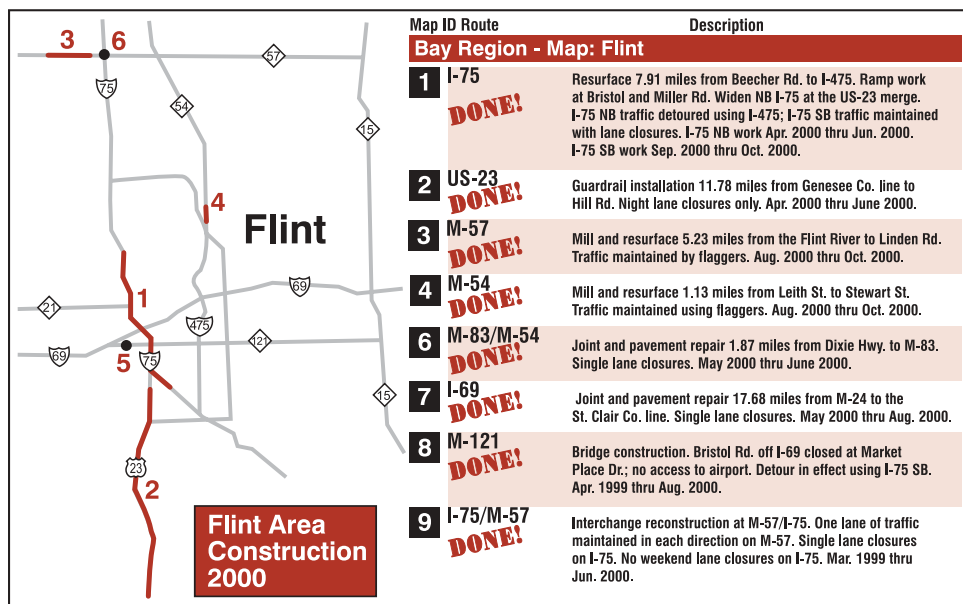
Reactive Maintenance is used to mitigate an unforeseen pavement problem that needs attention. These are only used to keep a poor pavement in a safe condition until either rehabilitation or reconstruction is possible. Pothole patching is the typical reactive maintenance activity.

Summary

MDOT maintains an inventory of pavement data, updated on a continuing two-year cycle. This data allows evaluation of pavement performance over time. RQFS and its related pavement management tools can then be used to predict future performance. This will be based on a given strategy of fixes chosen to maintain, or improve, overall pavement condition, in a cost-effective manner. The standard to which this is done is defined by the Michigan State Transportation Commission.

Bridge assets are similarly managed. Bridge condition is maintained with replacement, rehabilitation, preventive maintenance and reactive maintenance to form the same type of "mix of fixes" approach used for pavements.

In 2000, implementing a mix of fixes in the Flint area included reactive and capital preventive maintenance, as well as reconstruction and rehabilitation.



For Further Information -

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